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Montana's Forestry Best Management Practices Program: 20 Years of Continuous Improvement

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Under the federal Clean Water Act, states have developed nonpoint source control programs for forestry that range from voluntary to regulatory approaches. Nationally, management of runoff from forest roads is currently under scrutiny by courts, the US Environmental Protection Agency, and Congress. This article describes Montana's "blended" program of voluntary forestry best management practices (BMP) for roads and upland practices, and a Streamside Management Zone Act, which regulates operations near streams. Biennial audits over the past 20 years have shown continuous improvement, with BMP implementation rates increasing from 78% in 1990 to 97% in 2010. Observed water quality impacts have declined from an average of eight per harvest site in 1990 to less than one in 2010. Activities and culture that have promoted an effective program include regular compliance monitoring, customized landowner and logger education programs, strong buy-in from the forestry community, and program coordination by a statewide stakeholder group.

Keywords: water quality, best management practices, BMP, nonpoint source, stormwater

In the 40 years since passage of the federal Clean Water Act (CWA), states have taken a variety of approaches to address water quality impacts from forestry activities (Ice et al. 2010). The amendments to the CWA in 1987 added Section 319, which required states to assess what categories of nonpoint sources were most important and develop effective control strategies. It was left to states to decide if regulatory or nonregulatory (i.e., voluntary) approaches would be adopted. Nationally, 16 states have adopted programs that are regulatory, 22 have nonregulatory approaches, and the remainder have elements of both, which could be termed "blended" or "quasi-regulatory" (Schilling et al. 2009).

Currently, forest roads are under scrutiny by courts, the US Environmental Protection Agency (USEPA), and Congress as to whether they should be reclassified as point sources, because some roads have ditches and other runoff control measures that discharge pollutants to waters of the United States. This is in response to a Ninth Circuit Court of Appeals decision in *Northwest Environmental Defense Center versus Brown* (Ninth Circuit 2011). If the Ninth Circuit decision stands and there are no statutory or administrative remedies enacted, landowners and loggers may be required to obtain stormwater discharge permits for roads from USEPA or states under Section 402 of the CWA (USEPA 2012). For most states, movement to a fully regulatory permit-based approach to forest road management would be a significant departure in how forest roads have been managed for decades under established best management practice (BMP) programs. Montana has experiences with both regulatory and nonregulatory approaches to forest water quality protection that can inform the current national dialogue over classification and regulation of runoff from forest roads.

During the 1970s and 1980s, there was significant pressure by environmental inter-

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est groups to regulate forest practices in Montana. Over several legislative sessions, bills were introduced to enact a comprehensive state forest practice act modeled after other western states. The 1987 amendments to the CWA requiring nonpoint source planning added a further impetus. Although comprehensive forest practices legislation was never enacted, the 1987 Montana legislature passed House Joint Resolution (HJR) 49, which mandated a study of logging practices on water quality. The results of this study (Montana Environmental Quality Council 1988) led to the adoption of several targeted laws and voluntary programs to improve implementation of forestry BMPs in Montana. These included (1) formation of a multistakeholder BMP Working Group coordinated by the Montana Department of Natural Resources and Conservation (DNRC) in 1988, (2) development of a consistent set of voluntary BMPs for Montana in 1989, (3) adoption of a state Streamside Management Zone (SMZ) Act in 1991 that regulated timber harvest and other activities in a 50- to 100-ft zone on each side of streams (Montana Code Annotated [MCA] 77-5-301), (4) adoption of a state law in 1989 requiring landowners to notify DNRC in advance of conducting forest practices (MCA 76-13-420), and (5) legislative direction for DNRC to coordinate monitoring of BMP implementation, with biennial reports to the Environmental Quality Council (EQC) of the state legislature.

Montana's blended program of regulatory and nonregulatory approaches has been largely unaltered since 1991. This article presents results and lessons learned over 20 years of implementing the program.

Montana Forestry BMP Program

Montana's forestry BMPs were formally adopted in 1989 and are the consensus product of a BMP technical committee formed during the HJR 49 study. The BMPs comprise over 100 individual practices related to road and timber harvest planning and design; road and skid trail drainage, construction, and maintenance; slash disposal and site preparation; stream crossings; and more (Montana DNRC 2011).

The 1988 EQC report designated DNRC as the lead agency to develop educational programs for landowners and loggers, monitor BMP implementation, and work with landowners on adapting the BMPs over time. To enable stakeholder collaboration on these activities, a working group was created and facilitated by DNRC. The BMP Working Group today includes approximately 25 participants from state and federal public land-management agencies, Montana Department of Environmental Quality, industrial forest landowners, conservation organizations, private landowners and landowner groups, Montana State University (MSU) Extension Forestry Service, the Montana Wood Products Association, and the Montana Logging Association (MLA). The Working Group provides oversight of audits, approves modifications to the state BMPs, and makes recommendations on logger and landowner education programs. There are no defined terms for participants, and new organizations and individuals that have expressed interest in the group have been welcomed by DNRC and others.

Table 1. Number of audit sites by ownership category for each audit year.

Ownership	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008	2010
State	5	5	5	5	5	5	5	4	5	6	6
Federal	16	16	14	12	12	9	5	9	5	8	16
Industrial private	16	16	14	14	18	18	21	19	22	17	15
Nonindustrial private	7	9	13	13	12	10	12	7	12	11	8
Total	44	46	46	44	47	42	43	39	44	42	45

Methods

Audits are conducted every other year and cover all forested regions of Montana, including federal and nonfederal lands. To qualify for the state BMP audit, harvest units must have been logged in the previous 3 years, undergone at least one spring runoff cycle, and meet several minimum criteria (Ziesak 2010). These include a harvest area of 5 ac or more, the harvest must be conducted within 200 ft of a stream (or contains an access road that crosses a stream), and must have a minimum average timber volume removal per acre (currently 3,000 bd ft/ac in western Montana and 1,500 bd ft/ac in eastern Montana). The purpose of the minimum criteria is to focus the audit on sites that have a greater potential to impact water quality (USEPA 1997). During the winter preceding an audit year, public land-management agencies and industrial private landowners provide DNRC a list of all sites that meet the selection criteria. Qualifying nonindustrial private harvest sites are identified by DNRC based on site criteria contained in harvest notifications.

Harvest units meeting the minimum selection criteria are stratified by ownership category and region. Ownership categories include federal (US Forest Service and Bureau of Land Management), state, nonindustrial private, and industrial private. Regions include Northwest, West, and Central–Eastern (Ziesak 2010). Within these strata, the population is ranked for site attributes, including new road construction or reconstruction, harvest within an SMZ, and new stream crossings installations. Sample sites are distributed across ownerships and regions in approximate proportion to the statewide harvest. A systematic sample is randomly generated, with a higher sample intensity of sites with more site attributes. The intent of this is to achieve a good distribution of sample sites across the state in proportion to ownership category and amount of harvest and maximize the number of BMPs evaluated at a given site (USEPA 1997). The number of audit sites statewide has averaged 44 since 1990 and ranged from 39 to 47 in any given audit year. Table 1 shows the distribution of sample sites by ownership category by year. This sample of harvest sites represents 1–3% of the statewide total and up to 5% of higher-risk sites.

Management and Policy Implications

States currently have wide latitude in how they address water quality impacts from forestry activities under the federal CWA. There is intense debate underway about whether runoff from forest roads should be more tightly regulated. Should this change occur, it is expected to have significant implications on the forestry sector. This article describes 20-year results of Montana's program of voluntary BMPs for roads and upland harvest activities and a regulatory SMZ Act. Montana's experience shows that a cost-effective voluntary program, if properly constructed and implemented, can dramatically reduce water quality impacts and achieve compliance rates that are comparable with states with fully regulatory programs.

Table 2. Definitions for BMP and SMZ application ratings.

Application rating	Definition
5	Operation exceeds requirements of BMPs
4	Operation meets requirements of BMPs
3	Minor departure from intent of BMPs
2	Major departure from intent of BMPs
1	Gross neglect of BMPs

Table 3. Definitions for BMP and SMZ effectiveness ratings.

Effectiveness rating	Definition
5	Improved protection of soil and water resources over preproject condition
4	Adequate protection of soil and water resources
3	Minor and temporary impacts on soil and water resources
2	Major and temporary or minor and prolonged impacts on soil and water resources
1	Major and prolonged impacts on soil and water resources

Adequate, small amounts of material eroded; material does not reach draws, channels, or floodplain.
Minor, some material erodes and is delivered to draws but not to stream.
Major, material erodes and is delivered to stream or annual floodplain.
Temporary, impacts lasting 1 year or less; no more than one runoff season.
Prolonged, impacts lasting 1 year or more.

Three audit teams are organized to conduct harvest site inspections, with each assigned a geographic region. Teams are comprised of experts from seven disciplines: forestry, engineering, hydrology, soils, fisheries, conservation, and a logger or nonindustrial private landowner. Team members volunteer from state and federal agencies, landowners, consulting firms, and nonprofit organizations. For many positions, an alternate team member is also designated. A small stipend is available for volunteers not supported by an employer. Counting alternates, statewide participation on teams is about 50 people.

Not all of Montana's BMPs are likely to affect water quality or are applicable during a postharvest review. A total of 50 individual practices contained in the BMPs are audited by teams in the field. These include practices rated to road planning, location and design (8 BMPs), road construction and drainage (13 BMPs), road maintenance (5 BMPs), timber harvest design (3 BMPs), harvest skid trails and landings (5 BMPs), slash treatment and site preparation (5 BMPs), and 11 BMPs related to stream crossing design and installation. Rated and reported on separately are 13 practices related to the state SMZ law. In reviewing each site, the team observes any erosion rills or gullies, sediment plumes or pathways, and any road cut slope sloughing. For each individual practice, a rating is made for both application and effectiveness on a scale of 1 to 5 (Ehinger and Potts 1990). If a BMP is fully met, an application rating of 4 is given. Operations exceeding the required BMP are given a rating of 5. Departures from BMP application range from 3 to 1, depending on severity (Table 2).

BMP effectiveness is rated based on observed erosion and downslope sediment movement (Table 3). An effectiveness rating of 4 indicates the BMP was effective at controlling impacts (e.g., surface erosion, downslope sediment movement, and more). A rating of 5 indicates improved protection of soil and water resources over preproject conditions. Effectiveness ratings of 3 and lower correspond to varying levels of duration and impact to soil and water resources. Ratings of 3 or lower are reported as not effective. This approach is believed to be conservative, in that a small amount of sediment delivery is treated the same as a large volume of delivery.

Figure 1. BMP teams inspect road drainage and erosion control on a bridge approach during a calibration exercise before the 2004 audit. (Photo provided by Brian Sugden.)

Before each audit cycle, a quality control calibration meeting is held in which all teams participate (Figure 1). The objectives of this session are to orient new members to the process, calibrate the teams to rate practices consistently, discuss important interpretation issues, and visit a field site that can generate discussion among teams. A postaudit meeting of team members is also held to discuss any unusual situations or consistency questions encountered during the audit. These points are discussed among the teams and have resulted in adjustments to ratings.

Audits are conducted in July and early August, and individual teams typically visit two harvest sites in a day. Audits are attended by the landowner or landowner representative and often by the operation forester and logger. Before coming onto the site, the team discusses whether the entire harvest area, SMZ, and road network can be inspected in the allowable time frame of 2–3 hours. If the area is too large to be visited entirely, a subsample of the site will be inspected. In these cases the teams identify higher-risk portions of harvest units and road systems to inspect based on a map review. The audit team walks (and drives) the site as a group (Figure 2), inspecting road drainage and erosion control on new or reconstructed roads, stream crossings, skid

trails, landings, SMZs, and more. The intensity of the survey is variable and depends on the size of the harvest area and allowable time. Where available, teams typically inspect several miles of access road, three to five stream crossings, a quarter mile of SMZ, and several skid trails and landings. During the site inspection, BMP concerns are discussed by the team along the way. Some limited measurements are made, such as soil type, average slope, SMZ width, stream width and classification, number dimensions of any erosion features, and fish passage parameters at culverts. The audit concludes by rating and recording all applicable BMPs on the audit form in the presence of the landowner, logger, and any other observers. Audit scores are determined using a consensus process but will be resolved with a majority vote if consensus can not be reached. The landowner being audited is allowed to answer questions of the team but otherwise reserves comment until the audit is completed. Other observers are encouraged to attend.

Key metrics generated from the audit are the percentage of individual rated practices that meet or exceed BMP requirements, the percentage of practices that provide adequate or improved protection of soil and water resources, and the observed water quality "impacts" per site, which are defined as BMP effectiveness ratings of 1, 2, or 3. Results are reported by ownership category.

Results

Eleven audits have been held in Montana since 1990 (on even-numbered years) with results published before the biennial state legislative session. Audit reports have been prepared by Schultz (1990, 1992), Frank (1994), Mathieus (1996), Fortunate et al. (1998), Ethridge and Heffernan (2000), Ethridge (2002, 2004), Rogers (2006a), and Ziesak (2008, 2010). The most recent monitoring report and executive summary is posted on the DNRC website (Ziesak 2010).

Statewide BMP application rates (i.e., the percentage of total practices rated statewide that met or exceeded BMP requirements) increased from 78% in 1990 to 97% in 2010 (Figure 3, blue bars). Most of this improvement came in the 1990s, and results have been maintained at a high level over the past 10 years. Improvement in BMP application rates have been observed across all ownership categories (Figure 4).

In the vast majority of cases, if BMPs are applied properly they are also found to be effective at controlling rill or gully erosion and sediment delivery to streams (Figure 3, green bars). As such, the trend in effectiveness rates mirrors that for application, although the effectiveness rating is slightly higher. In some cases, impacts are not observed even if BMPs have not been fully applied (i.e., rating of a 3 on application and a 4 on effectiveness). An example of this is inadequate application of road draining BMPs where sediment deposits on the hillslope below the road and does not enter a nearby stream. In only rare circumstances in Mon-

Figure 2. West audit team inspecting a SMZ and harvest in 2008. (Photo provided by Brian Sugden.)

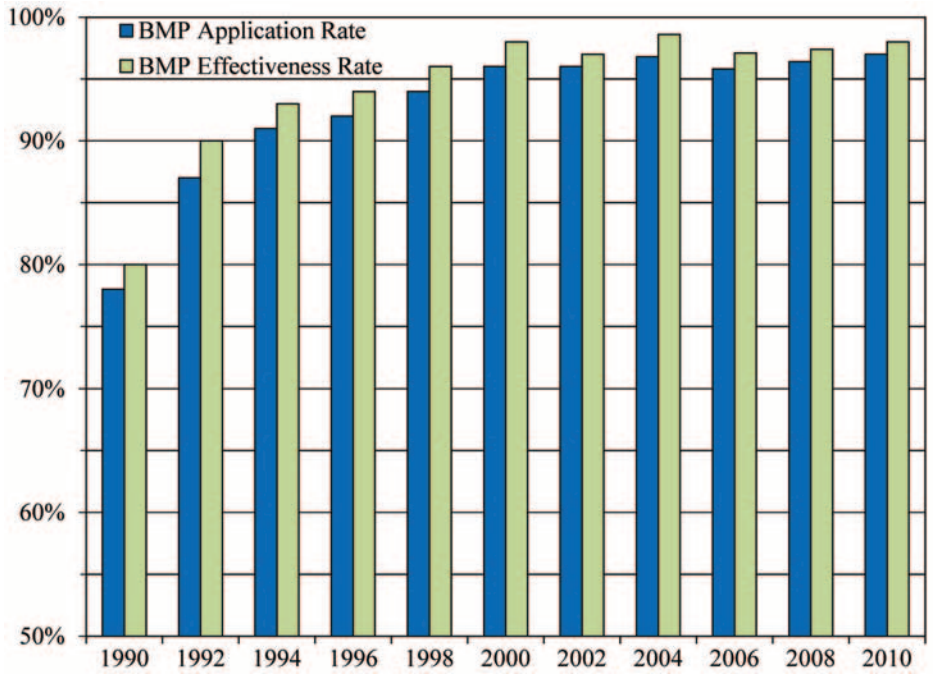

Figure 3. Percentage of rated BMPs that met or exceeded requirements across Montana (blue bars), and the percentage of rated BMPs determined to provide adequate or improved protection of soil and water resources (green bars).

Figure 4. Percentage of rated BMPs that met or exceeded requirements by ownership category.

tana is a BMP practice met but found to be ineffective at preventing impacts (i.e., rating of 4 on application but a 2 or 3 on effectiveness). When encountered, these become a continuing improvement discussion item by audit teams and the BMP Working Group. We note, however, that our effectiveness observations represent postharvest impacts after one to three runoff seasons, so sites may not have been subjected to large stressing storms. Longer-term effectiveness was validated during the 1998 audit and is discussed later in the article. The average number of observed impacts per site (BMP effectiveness ratings of 3, 2, or 1) has declined ninefold between 1990 and 2010 (Figure 5).

Rates of SMZ law implementation during the period 2000–2010 (Figure 6) are about a percentage point higher than the voluntary BMP application rate during this period. Seventy percent of SMZ departures are rated as minor and are usually related to improper SMZ boundary marking and/or minor equipment encroachment into the SMZ.

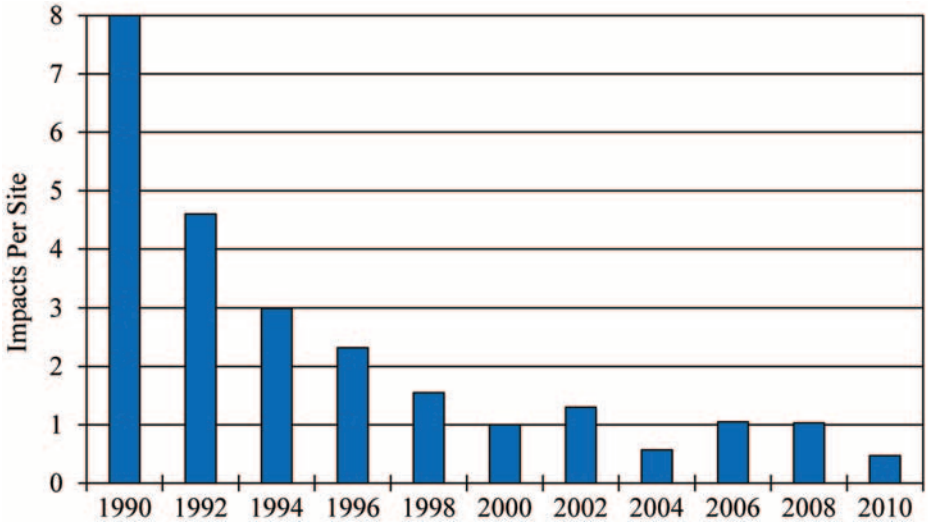

Figure 5. The average number of observed impacts per audit site.

Discussion

After adoption of forestry BMPs in 1989, DNRC collaborated with the MLA and MSU Extension Forestry to develop education programs for landowners, loggers, and foresters. In 1990, classroom BMP sessions for loggers were initiated, with instruction provided by DNRC and MLA staff. In addition, since 1995, more detailed BMP/SMZ workshops (with both classroom and

field instruction) have been held annually across Montana (typically five to nine towns and cities). At about this same time, industrial landowners began requiring foresters and contractors to attend workshops, and the MLA developed its Accredited Logging Professional (ALP) program. To date, BMP/SMZ training workshops have reached a cumulative audience of approximately 3,500 people. The BMP audit results have proven helpful in focusing logger education efforts over time.

MSU Extension Forestry developed a forest stewardship program targeting nonindustrial private landowners. This program teaches landowners about forestry and other natural resources and is completed when a landowner develops a stewardship plan for their property. Between 1991 and 2011, there were 136 forest stewardship workshops held, with 3,189 participants. The program has yielded 2,054 stewardship plans encompassing 1.1 million ac (Cindy Bertek, pers. comm., MSU Extension Forestry, Mar. 15, 2012). Education has evolved even further over the past 10 years with the ongoing development of the ALP program and requirements for logger training and BMP/SMZ implementation under the Sustainable Forestry Initiative and other forest certification programs.

Easy to understand education materials have been developed and are central to all training workshops. Color booklets containing photographs and other illustrations to better communicate BMPs to landowners and loggers were published (Logan and Clinch 1991, Logan 2001). DNRC also developed color guides to the SMZ law and rules (Fortunate 1994, Rogers 2006b).

BMP implementation rates today are uniformly high but vary among ownership categories (Figure 4). State and industrial private lands have reached a very high level of compliance, averaging 98% over the past five audit cycles dating back to 2002. This is significantly higher ($P < 0.05$) than federal and nonindustrial private ownership categories during this time frame. On average, audits on these ownerships observe less than one BMP departure per site, and these are typically minor.

BMP application rates on nonindustrial private lands have improved by 36 percentage points since 1990 (averaging 93% since 2002). This represents the largest increase of any ownership category. This improvement is attributed to several factors. Montana DNRC provides educational materials to nonindustrial private landowners on notification of forest practices and makes DNRC service foresters available for landowner assistance. However, it is challenging to achieve very high rates of compliance on nonindustrial private ownerships that may only harvest timber once every 20 years. There is also a constant influx of new private landowners that may have not had any exposure to previous forest management or training. Finally, nonindustrial private landowners do not necessarily have the technical resources that agencies and timber companies have. Audit teams must obtain permission from nonindustrial private owners to come onto their property to perform the review, and there have been instances that permission has not been granted. In many cases this is simply because an absentee landowner can not be on site during the audit time frame. But there is occasionally resistance to providing access. DNRC has worked through this by using the log purchaser, consulting forester, or contract logger as a liaison to allay concerns. We estimate that audit teams have not been able to visit 25% of selected nonindustrial private sample sites over the past 20 years. Overall, we believe this has had a minimal effect on results from this ownership category, but it is an uncertainty.

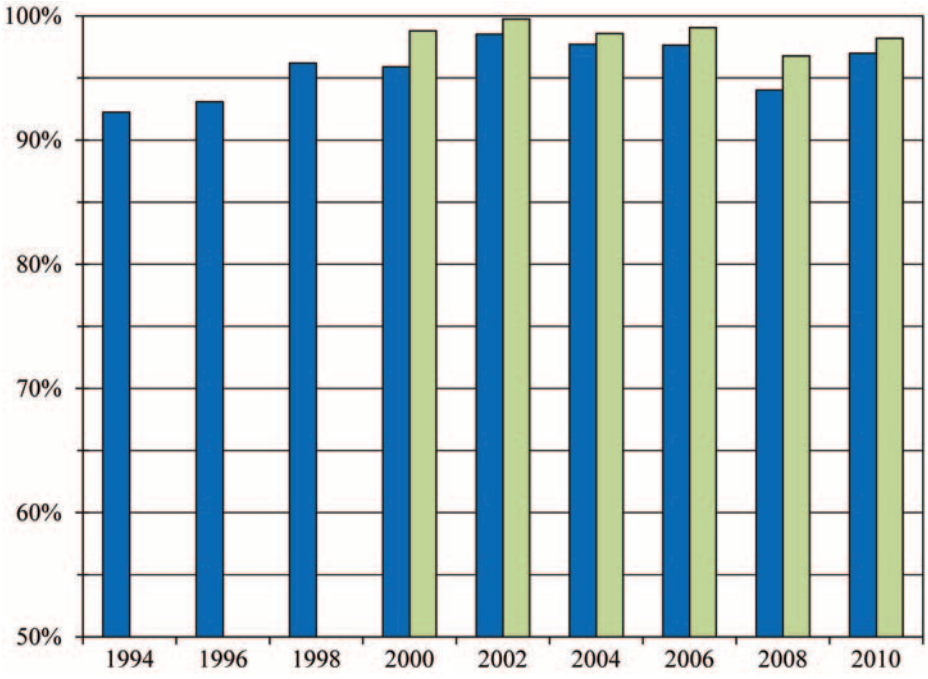

Figure 6. Percentage of rated SMZ practices that met or exceeded SMZ regulations across Montana (blue bars), and the percentage of rated SMZ practices determined to provide adequate protection of soil and water resources (green bars). SMZ effectiveness was not compiled in audit reports before 2000.

BMP application rates on federal lands have improved by ten percentage points over the 20-year period (averaging 94% since 2002) but slightly lag application rates observed on state and industrial private ownerships. The reason for this has been extensively discussed by audit team members over the years. The authors believe there are a number of contributing factors, including initial resistance by engineers to lower-standard and lower-impact roads, different people being involved in different phases of the project (e.g., harvest unit layout, roads, contracting, administration, and reforestation, to name a few), and a timing disconnect between available funding for road BMP upgrades and timber harvest projects. State and industrial private harvests are typically the responsibility of a single person who sees the project through the entire process, from conception to implementation. This increases ownership, accountability, and clear communication on the project.

These results are believed to be reflective of BMP application rates across Montana. The minimum site selection criteria have been set at levels where at least one-third of the harvest area in Montana is eligible for the audit. The sites that do not meet the minimum criteria represent a lower risk to water quality, because there is either no harvest close to streams or low timber volume per acre removed. Our experience

suggests that BMP application rates on nonqualifying lands are not appreciably different from what has been measured at qualifying sites.

A key factor in the success of Montana's audit program has been continuity of audit team member participation over time. Average tenure for team membership is more than five audit cycles (10 years), and several have participated for the entire 20 years. Because of this continued participation and teams having learned to work together, group consensus is reached in the vast majority of ratings. Only a few scores each year come down to a vote. It is also a fairly manageable program for people to commit time to. Team member involvement is capped at 10 days biennially, and in some cases, this time is divided with an alternate. There has been a declining trend in involvement among conservation/environmental interests in the state BMP program, both at the working group level and as participants on audit teams. In the most recent cycle, conservation representative slots were vacant on two of three teams despite recruiting efforts by DNRC. The reason for this lack of recent participation is unknown.

Montana's observational approach for evaluating BMP effectiveness does not physically measure water quality or biological response to timber harvest. However, it is believed to be a valid way to evaluate environmental success of the program, particularly with regard to impacts such as erosion and sediment delivery to streams. In a study in northeast Washington State, Corner et al. (1996) were able to detect sediment delivery from timber harvest operations using observational approaches that was not measurable with instream sampling. An observational approach was used by Litschert and MacDonald (2009) in the Sierra Nevada and Cascade Mountains of northern California. They inspected skid trails on 200 recent harvest units and found six instances of hillslope rills delivering sediment to streams (several where BMPs were not fully applied). Rivenbark and Jackson (2004) also used observational methods to determine locations where concentrated flow paths moved across SMZs and delivered to streams. Advantages of this approach include timely information, cost-effectiveness, and providing direct feedback on effectiveness of specific practices. A disadvantage is that erosion features and sediment movement are dependent on the occurrence of testing storms, and some observations are transient, such as road surface erosion features that may be masked by recent road grading. Although we believe the observational approach is powerful, it is important to complement these with instream monitoring projects to get a full picture of BMP effectiveness. These research efforts are underway across the United States to validate instream effectiveness of BMP and streamside practices (Ice and Schilling 2012). This includes research and monitoring undertaken in Montana in support of fisheries Habitat Conservation Plans (Plum Creek 2000, Montana DNRC 2012).

The BMP audit program has also created an opportunity for supplemental questions to be asked regarding the BMP program. In 1996, e.g., fisheries biologists involved with bull trout restoration in Montana asked the BMP Working Group if BMPs were effective over time (i.e., beyond our 2-year audit window). This was evaluated during the 1998 audit (Fortunate et al. 1998) by revisiting 11 sites previously assessed during the 1994 or 1996 audit cycles. These revisits found that BMPs were durable and effective over time when properly designed and implemented. Another supplemental question implemented in 2000 related to road BMP improvements that landowners were making in conjunction with projects. The supplemental question asked, "Did the project include improvements to the existing road system that reduced overall sediment delivery to streams?" This question was asked on 244 harvest units between 2000 and 2010 and was answered "yes" for 161 harvests (66%). The implication is that there is extensive watershed restoration being undertaken in conjunction with ongoing management. The percentage of harvests with "yes" to this question has declined in recent audit cycles because landowners have already upgraded much of the older road network to modern BMP guidelines. More recently, the BMP Working Group and a fish passage subcommittee developed an approach to evaluate fish passage at new stream crossing installations. The method needed to be easily incorporated into audits but yield reliable results. A fish passage "questionnaire" was pilot tested during the 2004 and 2006 audits. To allow time for landowner and logger education, it was not formally included in the BMP audits until the 2010 cycle.

The Montana Legislative Audit Division reviewed the BMP program during the 2006 audits (Montana Legislative Audit Division 2007). The conclusions of the report were as follows:

1. Partnerships and education have enhanced the implementation of sound forest practices.
2. Onsite inspections of forest practices and landowner consultations help compliance with BMPs.
3. BMP audits are an essential component for DNRC to evaluate if forest practices were conducted responsibly.
4. Voluntary BMPs are used in a high percentage of time near water.
5. Use of BMPs to protect water is part of forest practices culture.
6. Montana's current process of regulating forest practices, via a mostly voluntary process, appears to be achieving similar results in protecting water resources as states using a more regulation-oriented structure.

The report had one recommendation, which was to "… expand BMP audit selection criteria prior to the 2008 BMP audit cycle to audit/monitor a broader spectrum of timber harvest sites." The BMP Working Group had mixed feelings about this. Although it would be good to have a more complete assessment of BMP implementation across a wider range of sites, limited audit resources suggest choosing sites with streamside harvesting and other risk factors. The BMP Working Group resolved this by changing the selection process to require that two-thirds of audit sites are pulled from a higher-risk selection pool and one-third be pulled from a lower-risk pool. These changes were incorporated into the 2010 audit cycle.

The national average BMP implementation rate (weighted by state timber harvest volume as a percentage of the national total) is 89% (Ice et al. 2010). Montana's "blended" program has achieved an average voluntary BMP implementation rate of 96% over the past 10 years and an average regulatory SMZ application rate of 97% during this period. As reported by Ice et al. (2010), Montana's BMP implementation rate is very similar to compliance rates observed in other western states with comprehensive forest practices acts, including Idaho (96%), Oregon (96%), and California (94%). In addition, Montana's rate is higher than Washington (80%) and Alaska (89%). It is noted that caution must be exercised

when comparing results among states, because monitoring methods differ.

The cost of the biennial monitoring program for the state of Montana is not substantial. Because of the strongly volunteer nature of the program, the DNRC role largely involves logistics and reporting. No full-time employees have been added to implement this program. It is estimated that one employee focuses about 4 months of scattered time over a 2-year period to coordinate the audit and that the cost for team member stipends and travel during the audits is approximately $6,000.

Montana DNRC has 16 service foresters dedicated to landowner assistance and forest practices implementation, with a recent statewide timber harvest of 197,903,000 ft^3 (Smith et al. 2009). Much of this service forester time is spent with nonindustrial private landowners answering questions about BMPs, SMZs, and slash fire hazard abatement and providing technical assistance to landowners in the management of their forests. No more than 10% of each service forester's time is directly tied to the BMP program.

MLA and DNRC staff teaching BMP/SMZ workshops have emphasized the opportunity to embrace BMPs on voluntary terms, and the commonsense approach the state has developed has resonated with loggers and landowners. However, cultural change truly came when BMP implementation became a source of pride among loggers, and there was a "specter of defame" for noncompliance. With this culture shift and a strong commitment to environmental compliance by landowners, Montana's voluntary BMPs are not really viewed as discretional today.

Montana's program has served as a model both nationally and internationally. Our user-friendly color BMP booklet was among the first of its type in the country and was the model used by several other states. A Spanish language version was developed for the country of Chile. Our program has also caught the interest of the Rights and Resources Initiative (RRI), which is an organization working toward forestland tenure and policy reforms in developing countries. For the past 2 years, the RRI has convened a 5-day workshop titled "Rethinking Forest Regulation" at the University of Montana's Lubrecht Experimental Forest. The purpose of this project is for Montana to share its experiences in voluntary forestry BMPs, logger training, auditing, forest stewardship, and more. This workshop has been attended by individuals from throughout the world.

The experience of Montana's blended program of voluntary and regulatory practices designed to protect water quality is particularly pertinent as the courts, USEPA, and Congress consider the classification of forest roads as point or nonpoint sources of pollution under the CWA. This classification could affect program approaches used to protect water quality. Forest road networks are extensive and may have regular or only periodic use. Practical approaches, such as effective BMPs with high implementation rates, and visual audit methods that provide affordable assessments of water quality protection, will need to be part of any forest road pollution control program. Montana's success shows the importance of a culture of BMP implementation and water quality protection. Evidence of practices going beyond the BMP guidelines and improved protection of soil and water, especially for forest roads, shows how maintaining a viable forest products industry can lead to improved watershed protection under the right conditions.

Conclusion

The CWA has allowed states to tailor nonpoint forestry programs to their unique needs. Montana's blended approach of voluntary BMPs with regulatory SMZs has yielded above-average BMP implementation rates nationally (Ice et al. 2010). Education efforts that empower logging professionals and landowners to make harvest management and road planning and design decisions and a full commitment to BMPs by agencies and industrial landowners have been key elements in improving the protection of soil and water resources in Montana. Among loggers, the BMP program is viewed as a commonsense approach, and there is very strong buy-in. The cooperative attitude of Montana DNRC leadership and staff has also been a defining factor in the success of the program. There has also been tremendous support for the program among the natural resource professionals and others who volunteer for audit teams. They are proud of the changes they have seen over their time and are tremendous advocates for the program.

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